

**Module - 1****Chapter 1 : Introduction to Automation****1-1 to 1-8**

**Syllabus :** Definition and fundamentals of automation, Elements of Automated system, Automation principles and strategies, Levels of automation, types of automation, Advanced automation functions

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**Chapter 2 : Introduction to Artificial Intelligence****2-1 to 2-71**

**Syllabus :** Introduction to Artificial Intelligence, Introduction, Historical development, Intelligent Systems, Types of Intelligent Agents, Components of AI, Foundations of AI, Scope of AI, Current trends in AI, Relevance to Mechanical Engineering

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## Chapter 4 : Electro-pneumatic Circuits and PLC Discrete Control Systems

4-1 to 4-13

**Syllabus : Electro-pneumatic Circuits :** Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping; **PLC Discrete Control Systems :** Design of Pneumatic circuits using PLC Control (ladder programming only) up to 2 cylinders, with applications of Timers and Counters and concept of Flag and latching.

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**Module - 4**

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**Chapter 5 : Robots and their Applications**

**5-1 to 5-18**

**Syllabus :** Introduction to Robots, Types, Classifications, Selection of Robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a Robot, Robot feedback controls: Point to point control and Continuous path control, Control system for Robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications, Nex-gen robots.

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<b>Chapter 7 : Machine Learning</b>	<b>7-1 to 7-52</b>
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**Syllabus :** Machine Learning, Introduction, Types of machine learning: supervised, unsupervised, reinforcement learning, Learning with Decision Trees, Introduction to Decision Trees, Classification and Regression Trees, Concept of ensemble methods : bagging, boosting, random forests, K means clustering algorithm, K nearest neighbours algorithm, Hierarchical clustering

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## Chapter 8 : Regression Analysis and Neural Networks

**8-1 to 8-55**

**Syllabus :** Learning with regression, Linear regression, Logistic regression, Artificial Neural Networks, Concept of ANN, Basic Models of Artificial Neural Networks , Important Terminologies of ANNs , McCulloch-Pitts Neuron, NN architecture, Perceptron, Delta learning rule, Backpropagation algorithm, Gradient Descent algorithm, Feed forward networks, Activation functions, Introduction to AI Technologies in the realm of Automation, Concept of Natural Language Processing, Machine Vision, Deep learning, Expert systems, Genetic Algorithms, Industry 4.0

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